REMARKS

This communication is a full and timely response to the aforementioned non-final Office Action dated December 2, 2009. By this communication, claims 11 and 14 are amended. Claims 1-10, 12, 13 and 15-25 are not amended and remain in the application. Thus, claims 1-25 are pending in the application. Claims 1, 6, 11 and 14 are independent.

Reconsideration of the application and withdrawal of the rejections of the claims are respectfully requested in view of the foregoing amendments and the following remarks.

I. Rejections Under 35 U.S.C. § 101

Claims 11-16, 24 and 25 were rejected under 35 U.S.C. § 101 as allegedly not falling within one of the four statutory categories of invention.

In response to this rejection, independent claim 11 has been amended to recite that various steps of the method are performed in processing circuitry of an image processing apparatus. The amendments to claim 11 are supported throughout the specification and drawings. For example, Figure 1 of the present application illustrates an exemplary image processing apparatus, which includes, among other features, a halftone-dot determination unit 4. Exemplary features of the halftone-dot determination unit 4 are further illustrated in Figure 2, for example. As illustrated in Figure 2, the halftone-dot determination unit 4 includes processing circuitry embodied by a dividing unit 40. The processing circuitry of the dividing unit can implement the dividing step as recited in claim 11, for example. In addition, the halftone-dot determination unit 4 includes processing circuitry embodied by a large block isolated point calculation unit (e.g., adder 46), and a small block isolated point calculation unit (e.g., counters 41-45). The halftone-dot determination unit 4 also includes processing circuitry embodied by a halftone-dot region determination unit (e.g., comparator 47, OR circuit 48, and AND circuit 49).

By positively tying the steps of claim 11 to processing circuitry of an image processing apparatus, the method of claim 11 is positively tied to a particular machine. Therefore, the method of claim 11 complies with the machine-or-

transformation test of *In re Bilski*, and as such, recites patent-eligible subject matter under 35 U.S.C. § 101.

The method of claim 14 has been amended similar to the method of claim 11, and is therefore also positively tied to a particular machine in compliance with the machine-or-transformation test of *In re Bilski*.

Accordingly, Applicants respectfully submit claims 11 and 14, as well as claims 12-16, 24 and 25 which depend therefrom, recite patentable subject matter under 35 U.S.C. § 101. Therefore, Applicants respectfully request that the rejections of claims 11-16, 25 and 25 be withdrawn.

II.   Rejections Under 35 U.S.C. § 102(b)

Claims 1-3, 6-8, 11-16 and 18-22 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Ohuchi (U.S. 5,025,481). This rejection is respectfully traversed for at least the following reasons.

Exemplary embodiments of the present invention provide an apparatus and method that minimize deterioration in output image quality by appropriately distinguishing the attributes of image areas, particularly halftone-dot regions, and performing processing properly suited to such areas.

As illustrated in Figure 1, for example, an exemplary embodiment[1] of the present invention provides an image processing apparatus comprising a region determination unit 2, which includes a character determination unit 3 and a halftone-dot determination unit 4. As illustrated in Figure 2, for example, the halftone-dot determination unit 4 comprises a dividing unit 40 for dividing image data into large blocks of a prescribed size and further subdividing the large blocks into multiple smaller blocks. For example, as described in paragraphs [0025]-[0026] on pages 9 and 10 of the specification and illustrated in Figure 3, the dividing unit 40 divides the image data into large blocks having a size of M x N pixels, and further divides the large blocks into smaller blocks ① through ⑤ having a size of (i) x (j) pixels.

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[1] For the convenience of the Examiner and to illustrate support for the features of the present invention, references are made herein to exemplary embodiments described in the specification and the drawings. The references used herein are not intended to limit the claimed invention to the referenced embodiments.

As illustrated in Figure 2, for example, the disclosed embodiment also comprises a large block isolated point calculation unit 46 for calculating a number of isolated points contained in each large block established by the dividing unit 40. In addition, as illustrated in Figure 2, the disclosed embodiment also comprises a small block isolated point calculation unit 41-45 for calculating a respective number of isolated points contained in each small block ① through ⑤ established by the dividing unit 40.

Furthermore, the disclosed embodiment comprises a halftone-dot region determination unit 47-49 for determining whether or not a large block is a halftone-dot region. As described in paragraph [0031], the halftone-dot region determination unit 47-49 determines that a large block is a halftone-dot region if the following two conditions are satisfied: (1) all small blocks contained in the large block have an isolated point contained therein, based on the respective number of isolated points that are calculated for each of the small blocks, and (2) the number of isolated points calculated to be contained in the large block is greater than or equal to a first prescribed value (e.g., threshold value illustrated in Figure 2).

Accordingly, the disclosed embodiment provides that the halftone-dot region determination unit 47-49 makes to determinations. In a first determination, the halftone-dot region determination unit 47-49 determines whether all small blocks contained in the specified large block have an isolated point contained therein, based on the respective second numbers calculated by the small block isolated point calculation unit 41-45. Accordingly, the algorithm used by the halftone-dot region determination unit 47-49 means that the determination will be false if at least one small block does not have an isolated point contained therein.

Independent claims 1, 6, 11 and 14 recite various features of the above-described exemplary embodiments. Claims 1 and 6 recite an exemplary apparatus, and claims 11 and 14 recite an exemplary method.

Claims 1 and 6 each recite an image processing apparatus that comprises a halftone-dot region determination unit for determining whether or not a specified large block is a halftone-dot region.

Claim 1 recites that the halftone-dot region determination unit determines that a specified large block among the large blocks established by the dividing unit is a

halftone-dot region if <u>all small blocks in the specified large block have an isolated point contained therein</u>, based on the respective second numbers calculated by the small block isolated point calculation unit, and if the first number of isolated points calculated to be contained in the specified large block by the large block isolated point calculation unit is greater than or equal to a first prescribed value.

Claim 6 recites that the halftone-dot region determination unit determines that the large block is a halftone-dot region if <u>all small blocks in the large block have an isolated point contained therein</u>, based on the respective first number of isolated points calculated by the small block calculation unit, and if the second number of isolated points calculated to be contained in the large block by the large block isolated point calculation unit is greater than or equal to a first prescribed value.

The methods of claims 11 and 14 recite steps corresponding to the constituent elements of the image processing apparatuses of claims 1 and 6, respectively.

To establish a *prima facie* case of obviousness, the applied reference(s) must disclose or suggest all the claimed features. See MPEP 2142; 706.02(j). If the applied references fail to disclose or suggest one or more of the features of a claimed invention, then the rejection is improper and must be withdrawn. Applicants respectfully submit that Ohuchi does not disclose or suggest all the recited features of independent claims 1, 6, 11 and 14 for the following reasons.

Ohuchi discloses an apparatus and method for discriminating a dot region of an image contained in a digital input image signal. The input image signal is generated by making a raster scan of a document image in which a dot image (e.g., a photograph) and a line image (e.g., a character) coexist. An input image processing part 11 stores a quantity of the received input image signal amounting to a predetermined number of scan lines that are required to discriminate the dot region. For example, the input image signal amounting to N x 3 scan lines are stored, where N denotes a number of picture elements that determines a unit block B comprising N x N picture elements for detecting the dot region (see Column 17, lines 52-66, and Figure 3).

With reference to Figure 3, Ohuchi discloses that an extreme point detecting part 12 receives the input image signal from the input image processing part 11 and

successively applies a predetermined matrix comprising M x M picture elements with respect to each picture element m included in the input image signal. Figure 4A of Ohuchi illustrates a matrix comprising 3 x 3 picture elements (m_0 to m_8), Figure 4B illustrates a matrix comprising 4 x 4 picture elements (m_0 to m_{15}), and Figure 4C illustrates a matrix comprising 5 x 5 picture elements (m_0 to m_{24}). Ohuchi discloses that the extreme point detecting part 12 detects whether or not a center picture element m_0 of the matrix M x M is an extreme point that indicates a peak or valley of the density change based on the density relationships with surrounding picture elements m_1 through m_i ($i = M^2 -1$) (see Column 17, line 66 to Column 18, line 14).

With reference to Figure 3, Ohuchi discloses that a dot region detecting part 13 divides the image described by the input image signal into blocks B each comprising N x N picture elements, subdivides each block B into a plurality of small regions C_i, and counts the number of extreme points indicating the valleys for each small region C_i of each block B. Figure 5 of Ohuchi illustrates a case where N=9 and the block B comprises 9 x 9 picture elements, and Figure 16 illustrates a case where i=4 and each block B is subdivided into four smaller regions C_1, C_2, C_3 and C_4. The dot region detecting part 13 discriminates whether or not a predetermined picture element within the object block B_0 (see Figure 6) belongs to the dot region, <u>based on the relationship between a number P_0 of extreme points of the object block B_0 and numbers P_1 through P_8 of extreme points of surrounding blocks B_1 through B_8</u> (see Column 18, lines 15-31). In particular, with reference to steps S41-S45 illustrated in Figure 17, Ohuchi discloses that each block B is subdivided into the small regions C_1 through C_4, and a number q of extreme points is obtained for each of the small regions C_1 through C_4. Step S42 determines the number Q of small regions C_i in which q=0 for each block B with respect to both the peak and valley. Step S43 discriminates whether Q is greater than a predetermined value Q_{TH}. If $Q>Q_{TH}$, step S44 sets the number P of extreme points of the block B to P=0. On the other hand, if $Q \leq Q_{TH}$, step S45 obtains the sum of the numbers of q for the peaks and valleys, and sets the larger sum Σq as the number P of extreme points in this block B (see Column 20, lines 39-52).

With reference to Figure 3, Ohuchi discloses that a region discrimination signal output part 14 outputs a discrimination signal that indicates whether each

picture element belongs to the dot region or the line region based on the result of the detection made in the dot region detecting part 13 (see Column 18, lines 32-36). As described above, the dot region detecting part 13 of Ohuchi discriminates whether or not a predetermined picture element within an object block B belongs to the dot region <u>based on the relationship between a number P_0 of extreme points of that object block B and numbers P_1 through P_8 of extreme points of the surrounding blocks</u> (see Column 18, lines 15-31).

Accordingly, Ohuchi discloses that the number P_B of extreme points in regions C_1 to C_i of block B are counted (see steps S41 to S45 in Figure 17), and the number P_B of extreme points of that block B are compared with the number P_1 through P_8 of extreme points of the surrounding blocks. Thus, Ohuchi discloses that the determination of whether block B belongs to the dot region is dependent on the number of extreme points in block B in comparison with the number of extreme points of the surrounding blocks B_1 to B_8.

In an attempt to arrive at the halftone-dot region determination unit as recited in claim 1, for example, the Office referred to Figure 6 and Column 18, lines 17-28 of Ohuchi. Applicants respectfully submit that these sections of Ohuchi, nor any other section of Ohuchi, do not correspond or amount to the halftone-dot region determination unit as recited in claim 1.

As noted above, the halftone-dot region determination unit of claim 1 determines that a specified large block among the large blocks established by the dividing unit is a halftone-dot region if <u>all small blocks in the specified large block have an isolated point contained therein</u>, based on the respective second numbers calculated by the small block isolated point calculation unit, and if the first number of isolated points calculated to be contained in the specified large block by the large block isolated point calculation unit is greater than or equal to a first prescribed value.

Ohuchi does not perform this determination. On the contrary, with reference to Figure 5 of Ohuchi, block B is defined such that picture element n_0 is in the center. In related Figure 16, block B is subdivided into a plurality of small regions Ci. As shown in Figure 17, even though one of small regions Ci does not have an extreme point (q=0), it is possible to proceed to steps S45 and S6. Accordingly, Ohuchi does

not determine that a specified large block among the large blocks established by the dividing unit is a halftone-dot region if <u>all small blocks in the specified large block have an isolated point contained therein</u>, as recited in claim 1.

In the claimed invention, the halftone-dot region determination unit determines that <u>a specified large block</u> among the large blocks established by the dividing unit is a halftone-dot region. On the contrary, the technique of Ohuchi determines that a specific picture element in block B belongs to a dot region. Therefore, Ohuchi's technique is fundamentally different from the halftone-dot region determination unit as recited in claim 1, for example.

Furthermore, the claimed invention provides numerous advantages over the technique of Ohuchi. The claimed invention provides an advantageous effect in that the process speed to complete the determination for a whole page image is improved over conventional techniques such as Ohuchi. On the contrary, the technique of Ohuchi requires considerable time to complete the determination for a whole page image because Ohuchi determines a type of region for each picture element n0 and repeats this process with each other block B. The technique of Ohuchi therefore cannot achieve the high speed processing obtainable by the claimed invention.

This is because, for example, Ohuchi does not disclose or suggest a technique that can determine whether a specified large block is a half-tone dot region without having to also determine whether neighboring blocks constitute a half-tone dot region. On the contrary, in the process of Ohuchi, <u>the dot region determination is executed repeatedly for all picture elements</u> (see steps S6, S7 and S8 in Fig. 17. Corresponding steps are also included in the flowcharts of Figs. 8, 12 and 15). This is a fundamental distinction between the claimed invention and Ohuchi. The claimed invention enables a determination of whether a specified large block is a halftone-dot region, whereas Ohuchi requires the entirety of an image to be analyzed to determine whether an object block B is a halftone-dot region.

In contrast to the claimed invention, Ohuchi does not disclose or suggest that a halftone-dot region determination unit determines that a specified large block among the large blocks established by the dividing unit is a halftone-dot region if <u>all small blocks in the specified large block have an isolated point contained therein</u>,

based on the respective second numbers calculated by the small block isolated point calculation unit, and if the first number of isolated points calculated to be contained in the specified large block by the large block isolated point calculation unit is greater than or equal to a first prescribed value, as recited in claim 1. Ohuchi also does not disclose or suggest the corresponding determining step as recited in the method of claim 11.

Similarly, Ohuchi does not disclose or suggest that a halftone-dot region determination unit determines that the large block is a halftone-dot region if <u>all small blocks in the large block have an isolated point contained therein</u>, based on the respective first number of isolated points calculated by the small block calculation unit, and if the second number of isolated points calculated to be contained in the large block by the large block isolated point calculation unit is greater than or equal to a first prescribed value, as recited in claim 6. Ohuchi also does not disclose or suggest the corresponding determining step as recited in the method of claim 14.

Accordingly, for at least the foregoing reasons, Applicants respectfully submit that claims 1, 6, 11 and 14 are patentable over Ohuchi, since Ohuchi does not disclose or suggest all the recited features of claims 1, 6, 11 and 14.

III.   Rejections Under 35 U.S.C. § 103(a)

Dependent claims 4, 5, 9, 10, 17 and 23-25 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Ohuchi in view of Kingetsu et al. (U.S. 6,268,935, hereinafter "Kingetsu"). This rejection is respectfully traversed for at least the following reasons.

Similar to Ohuchi, Kingetsu does not disclose or suggest the halftone-dot region determination units of claims 1 and 6 and the corresponding determining steps of claims 11 and 14.

Therefore, no obvious combination of Ohuchi and Kingetsu can arrive at the subject matter of claims 1, 6, 11 and 14, since Ohuchi and Kingetsu, either individually or in combination, fail to disclose or suggest all the recited features of claims 1, 6, 11 and 14.

Accordingly, for at least the foregoing reasons, Applicants respectfully submit that claims 1, 6, 11 and 14 are patentable over Ohuchi and Kingetsu.

Dependent claims 2-5, 7-10, 12, 12 and 15-25 recite further distinguishing features over Ohuchi and Kingetsu. The foregoing explanation of the patentability of independent claims 1, 6, 11 and 14 is sufficiently clear such that it is believed that separately arguing the patentability of the dependent claims is unnecessary at this time. However, Applicants reserve the right to do so if it becomes appropriate.

IV.   Conclusion

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. Accordingly, a favorable examination and consideration of the instant application are respectfully requested.

If, after reviewing this Amendment, the Examiner believes there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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